

A METHOD AND SYSTEM FOR A HIGH-DENSITY PLASMA DEPOSITION
PROCESS FOR FABRICATING A TOP CLAD FOR PLANAR LIGHTWAVE
CIRCUIT DEVICES

5 ABSTRACT OF THE DISCLOSURE

A method for performing high aspect ratio gap fill during planar lightwave circuit top clad deposition. A plurality of waveguide cores are formed on a substrate, the waveguide cores having a plurality of gaps there between. A cladding layer is formed over the waveguide cores and the substrate using a high-density plasma deposition process. The refractive index of the waveguide cores are controlled by using a dopant to be higher than the refractive of the cladding layer. An anneal process is performed on the cladding layer after the high-density plasma deposition process. The gaps between the waveguide cores can be smaller than 2 microns. The aspect ratio of the gaps between the waveguide cores can be greater than 3. The high-density plasma deposition process provides a very high purity USG (undoped silica glass) and BPSG (Boron Phosphorous silica glass) layers having a uniform refractive index. An overlying layer of doped silica glass can be deposited over the HDP deposited layer using PECVD (plasma enhanced chemical vapor deposition) techniques.

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The doped silica glass can comprise BPSG or GeBPSG (Germanium Boron Phosphorous silica glass).